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BRIDGING THE ARCHIPELAGO: E-GOVERNMENT IMPLEMENTATION CHALLENGES AND DIGITAL INEQUALITY IN REMOTE ISLAND COMMUNITIES OF NORTH MALUKU

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Abstract

Digital transformation through e-government systems in Indonesia faces geographic and structural challenges that fuel the digital divide in border regions. This study aims to analyze the multidimensional challenges of implementing digital public services and to map patterns of digital inequality occurring in isolated island communities. Using a qualitative approach with an exploratory case study design, this research was conducted in three earthquake-prone island regions of North Maluku Province: South Halmahera Regency, the Sula Islands, and Taliabu Island. Data were collected through in-depth interviews with 25 key informants—including policymakers, field service providers, and local residents—and supplemented by field observations and document analysis. Data were analysed thematically through the stages of data condensation, data presentation, and conclusion-drawing, with validity tested via triangulation. The research findings indicate that the implementation of digital services is hampered by a lack of telecommunications infrastructure and electricity, low digital literacy among local bureaucrats, and a centralized application architecture that is incompatible with island conditions. These conditions widen the digital divide from merely a matter of physical access to one of socioeconomic exclusion, where residents must incur high maritime transportation costs to access conventional services. Nevertheless, communities have developed local adaptation strategies by utilizing traditional transportation methods to transmit administrative documents. This study concludes that the national digitization policy needs to reorient its approach from a one-size-fits-all model toward an archipelago-based digital government model that integrates a hybrid system architecture and the institutionalization of local digital intermediaries to achieve social justice.

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INTRODUCTION

Digital transformation through the implementation of an electronic-based government system (e-government) has become a national strategic agenda to improve efficiency, transparency, and the quality of public services in Indonesia. Through Presidential Regulation No. 95 of 2018 on the Electronic-Based Government System (SPBE), the government is striving to integrate public services to achieve inclusive and responsive governance. However, as an archipelagic state, the acceleration of this digitalization faces geographical and structural challenges that have led to a significant digital divide between central and border regions (Antasari Bandjar, Rosdawiyah, 2026). This disparity is no longer limited to the availability of physical infrastructure (first-level digital divide) but has expanded to include digital literacy and technological utilization capabilities (second-level digital divide) at the local community level (Rumasukun et al., 2026).

North Maluku Province is a clear example of the dynamics of the digital divide in small and outermost island regions. The region's geography, dominated by water and island chains, gives rise to critical issues such as disparities in telecommunications connectivity, limited electricity supply, and a lack of supporting infrastructure for information and communication technology (Bengkalis & Syarofi,

2026). At a time when local governments are required to adopt digital public service systems—such as electronic licensing, digital civil registration, and e-health—communities in remote island regions are, in fact, isolated from these basic digital services. Consequently, the implementation of e-government—which ideally aims to bridge bureaucratic gaps—actually has the potential to create new forms of social exclusion for island communities (Meliany et al., 2026).

Various previous studies have examined the challenges of e-government in Indonesia, but the majority of research still focuses on the dynamics on the island of Java or in mainland urban areas that have adequate infrastructure (Mellyana Eka Mardiana, Rizki Aulia Adinda, 2021). Research that specifically examines the challenges of e-government within the geographical landscape of isolated archipelagos, such as North Maluku, remains very limited. Furthermore, there is little literature that deeply explores how island communities adapt or employ coping mechanisms in the face of the digital marginalization they experience. This research gap underscores the need for a comprehensive study linking e-government policies at the macro level with the empirical reality of digital inequality at the micro level within island communities.

Based on these dynamics, this study aims to analyze the multidimensional challenges in the implementation of e-government and to map patterns of digital inequality occurring in communities on the Teremote Islands in North Maluku Province. The novelty of this study lies in its socio-technical approach, which not only assesses the technological readiness of the bureaucracy but also integrates the perspective of digital justice for island communities. The practical and theoretical contributions of this research are expected to serve as a foundation for policymakers in formulating an inclusive and equitable archipelagic-centric e-government model in Indonesia.

METHOD

Research Design

This study employs a qualitative approach using an exploratory case study design to conduct an in-depth investigation of the challenges in implementing e-government and the phenomenon of the digital divide in isolated island communities (Yin, 2014). A qualitative approach was chosen because it is capable of capturing the sociocultural context, geographic dynamics, and subjective experiences of local communities and local government officials in responding to the digitization of public services in a holistic manner (Creswell et al., 2007).

Location and Participants

This study was conducted in North Maluku Province, with a specific focus on three earthquake-prone island regions: South Halmahera Regency (Obi Island), Sula Islands Regency, and Taliabu Island Regency. Site selection was carried out using purposive sampling based on criteria of geographic isolation and disparities in ICT accessibility.

Research informants were selected using a combination of purposive sampling and snowball sampling techniques to ensure a representative range of perspectives, from policymakers to beneficiaries (Neuman, 2014). Informants were grouped into three main categories, namely: (1) Policy Makers (Key Informants) consist of officials from the Department of Communication, Information Technology, and Cryptography (Diskominfo), the Regional Development Planning Agency (Bappeda), and the Department of Population and Civil Registration. (2) Field Service Providers are sub-district and village government officials in the earthquake-affected island regions. (3) Service Users/Community Members are community leaders, fishermen, youth, and local MSME operators in isolated areas (blank spots).

Data Collection Techniques

Data collection was conducted comprehensively using three main techniques: (1) In-Depth Interviews were conducted with 25 key informants to explore structural constraints, digital literacy, and community adaptation to electronic service systems. (2) Field Observations were used to examine the physical condition of ICT infrastructure (signal availability/cell towers, power stability), as well as the operational dynamics of digital public services at local offices. (3) Documentary Study, which analyzed regional SPBE policy documents, Diskominfo performance reports, statistical data on the digital divide (BPS), and relevant regional regulations.

Data Analysis and Validity

Qualitative data were analyzed using thematic analysis in accordance with the interactive qualitative analysis framework developed by Miles et al. (2014). The analysis process comprised three simultaneous stages, namely: (1) Data Condensation, which involved selecting, simplifying, and coding interview transcripts and field notes based on the main themes of e-government challenges and

dimensions of the digital divide. (2) Data Display involved organizing the categorized data into descriptive narratives, comparative matrices across islands, and flowcharts of technological and bureaucratic constraints. (3) Conclusion Drawing/Verification involved formulating patterns of relationships among categories and testing the validity of the data.

To ensure data trustworthiness, this study employed source triangulation and data collection method triangulation, as well as member checking by reconfirming key findings with several key informants (Cresswell & Cresswell, 2018; Sugiyono, 2021).

RESULTS AND DISCUSSION

Results

Based on a thematic analysis of in-depth interview transcripts, field observation notes, and policy documents from South Halmahera Regency (Obi Island), Sula Islands Regency, and Taliabu Island Regency, the research findings were grouped into two main areas: (1) A Typology of Multidimensional Challenges in E -Government Implementation and (2) The Construction of the Digital Divide in Island Communities.

Typology of Multidimensional Challenges in E-Government Implementation

The implementation of the Electronic-Based Government System (SPBE) in the remote island regions of North Maluku Province faces systemic and interconnected obstacles. Details regarding the dimensions, empirical indicators, and their impact on public service operations are presented in Table 1.

Table 1. Typology of Challenges in Implementing E-Government in the Remote Island Regions of North Maluku

Dimensions of the Challenge	Field Findings Indicators	Impact on Public Services
Hardware/Physical	1. Blank spots account for 40%–60% of small islands. 2. PLN's power supply is limited (electricity is available only 6–12 hours a day at the village level). 3. Damage to cell towers caused by severe weather is slow to be repaired.	Administrative data transactions are periodically interrupted; the local server repeatedly crashes due to power fluctuations.
Human/Organizational	1. Low ICT literacy among village and subdistrict officials (less than 30% are proficient in using the SPBE application). 2. The absence of a Computer Administrator functional position at the subdistrict level.	High reliance on manual processing; data entry for services is often delayed (backlog).
Software/Technical	1. The application is designed using a centralized (top-down) approach based on a broadband connection as proposed by headquarters.	The system freezes when the connection is unstable; field staff cannot process files in real time.

	2. There is no offline-to-online synchronization feature (asynchronous mode).	
Sociological & Local Culture (Socio-Cultural)	1. The public has greater trust in physical documents bearing a wet stamp. 2. Citizens' concerns about the security of personal data in online systems.	Low public participation in adopting self-service apps.

Source: Compiled by the Author, 2026

The Construction of the Digital Divide in Island Communities

The geographical conditions of island regions highlight how the digital divide has escalated from merely a matter of technological accessibility to an issue of socioeconomic exclusion. The patterns of this divide and its manifestations on the ground can be summarized into three main levels, namely: (1) First-Level Divide: The disparity in the ratio of signal transmitters (BTS) and fiber-optic networks between regency capitals (such as Labuha or Sanana) and isolated island regions (such as South Obi or West Taliabu) is stark. (2) The Second-Level Divide: Island communities with low educational attainment and older generations experience disorientation when confronted with complex, technically oriented public application user interfaces. (3) The Third-Level Divide: Island communities affected by earthquakes must bear significant financial burdens to access basic services. Residents of Taliabu Island, for example, report having to pay sea transportation costs ranging from Rp350,000 to Rp800,000 for a trip to the regency center just to handle in-person verification of civil registration documents that could not be processed digitally due to network constraints in their villages.

As a form of defense, the local community has developed coping mechanisms. Residents use a document delivery service via traditional motorboats (longboats) that sail to islands with cell service, or they physically travel to specific geographic locations—such as hilltops or outermost piers—at certain times of day when the signal reaches optimal range.

Discussion

The findings of this study confirm that the implementation of public service digitization policies in Indonesia's archipelago cannot be assessed solely through the lens of technocratic efficiency. The data in Table 1 demonstrate the presence of imposed technological determinism through macro-level SPBE regulations that fail to take into account socio-technical readiness in border regions and on small islands.

Analytical Interpretation and Theoretical Comparison

Analytically, the disparities observed in North Maluku indicate a transformation from a first-level digital divide to a third-level digital divide. The lack of basic infrastructure and electricity (as shown in Table 1), which initially constituted technical constraints, has evolved into structural barriers that undermine social justice (digital injustice). This finding aligns with arguments emphasizing that digital development in archipelagic nations is often trapped in a "mainland bias"—the assumption that all regions possess homogeneous infrastructure characteristics similar to those on the main island or in urban areas.

When local governments reduce the share of manual services under the assumption that all processes have transitioned online, earthquake-affected communities actually experience double exclusion. On the one hand, they cannot access digital applications due to "blank spots"; on the other hand, access to conventional services becomes increasingly limited and financially burdensome. This reinforces the study (Ariansyah et al., 2019) on social exclusion resulting from non-inclusive digitization policies in Eastern Indonesia.

However, findings regarding the coping mechanisms of island communities—such as sending data via motorboats and searching for signals based on the geographical landscape—offer a new perspective that differs from previous findings (Pratama and Wijaya, 2021). While previous studies tended to portray remote communities as passive victims of the digital divide, the findings of this research demonstrate that island communities possess social agency and local resilience in overcoming technological limitations to secure their administrative rights.

Conceptual Sustainability and Research Innovation

The contribution of these research findings to enriching the body of knowledge in the social sciences and public administration lies in the formulation of the Archipelagic-Centric E-Government Model framework. This research rejects the "one-size-fits-all" paradigm in national digitization policy and offers two pillars of theoretical thought, namely: (1) Asynchronous-First Architecture—public service information systems in archipelagic regions must be designed with an "offline-first" approach. Applications must be capable of storing data inputs locally at the village level and performing automatic synchronization when devices connect to the internet, without interrupting citizen service processes. (2) Institutionalizing Digital Intermediaries: To address the disparities in the second- and third-level digital divides, the government cannot rely solely on self-service participation by the public. It is necessary to institutionalize the role of digital intermediaries—such as village field officers or local ICT volunteers—who act as a human bridge between isolated communities and the digital bureaucratic system.

Thus, the theoretical contribution of this research expands the theory of socio-technical systems in the social sciences and public administration: the success of digitization in archipelagic regions is not determined by how sophisticated the applications developed at the central level are, but rather by how adaptable those systems are in accommodating geographical realities, infrastructure limitations, and the cultural capacities of frontline communities.

CONCLUSION

The implementation of e-government in the earthquake-prone island regions of North Maluku Province has been shown to exacerbate the digital divide, leading to the socioeconomic exclusion of local communities. This failure to adapt stems from a centralized (top-down) system design, a lack of basic ICT and energy infrastructure, and limited capacity among local bureaucratic personnel. Although communities have demonstrated resilience through local coping mechanisms, ensuring access to public services still requires targeted policy interventions. This study recommends reorienting national digitization policy toward an Archipelago-Based E-Government Model that integrates hybrid offline-to-online technologies and strengthens the role of community-based digital intermediaries.

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